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Water in Afghanistan: a modern history

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Abstract
This paper discusses water in Afghanistan from the late nineteenth century through the early twenty-first century. This broad chronology is periodized using the historical themes of colonialism, nationalism, international developmentalism, and global warfare. Modern hydraulic technology arrived in the domestic architecture of Kabuli state elites beginning in the 1860s and accelerating greatly in the 1890s. The first decades of the twentieth were marked by continuing developments regarding palatial hydrology (pools, fountains, etc.) and new forms of modern hydraulic engineering (piped water, dams and bridges) primarily in and around Kabul involving the Kabul river and its tributaries. The middle decades of the twentieth century involved substantial engagement of rivers throughout country under the various ideological and material regimes of international development sponsored by the US, USSR and a number of other global actors and sanctioned by local political elites who became increasingly dependent on the global system. The decades surrounding the year 2000 have been marked by intense and sustained overt and covert global warfare. The effects of war on the environment of Afghanistan from the perspective of Human Rights, particularly Afghan Peoples' Rights to Water, constitute the final section of the paper.

Keywords Afghanistan · Rivers · Dams · Development · Environment · War

As a subfield within the discipline of history, environmental history has been rapidly expanding in various directions in the twenty-first century. This surge in consciousness and productivity is predicated on a substantive foundation of environmental history monographs that appeared in the last decades of the twentieth century. The interdisciplinary

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fields of Middle Eastern Studies and South Asian Studies have benefited enormously from this environmental turn in the historical sciences understood as a complex aggregate field of inquiry.[1] With these historiographic developments in mind, the purpose of this paper is to survey the modern history of water in Afghanistan from the late-nineteenth to the early twenty-first centuries. The modern development of water resources in Afghanistan has required a collusion of competing interests between local elites and foreign technocrats through a series of asymmetrical colonial relationships that have been central to a larger political economy of dependency and destabilization that has ensnared the country.

Geologic time

A modern history of water in Afghanistan must necessarily begin with deeply pre-modern time scales, specifically, the overriding issues of the global climate and local mountains from where the water comes. The Hindukush mountains that geographically define Afghanistan are part of the much larger Himalayan mountain range that spans across Central and East Asia. The Himalayas formed roughly 50 million years ago when the Indian tectonic plate, after separating first from the Pangaea supercontinent and then from the derivate continental cluster of Gondwana beginning approximately 125 million years earlier, collided with the Eurasian plate (Zhisheng et al. 2001). The Himalayas now separate the South Asian subcontinent from the Tibetan plateau that is the world's primary water tower as quantified by the number of people supported by the basins of the Indus, Brahmaputra, Mekong and Yangtze rivers. These and other major rivers originate in what has been referred to as the globe's "Third Pole" formed by the Tibetan glaciers (Xu et al. 2008). The hydrological cycle involving the Tibetan plateau and the Himalayas is fueled by the bi-annual monsoon wind and rain patterns that characterize the tropical climate of South and Southeast Asia. For the glacial, river and ground waters of Afghanistan, the main geo-historical and climatological elements to be cognizant of are the Hindukush mountains, Tibetan glaciers and the monsoon.

Afghanistan's river basins

From an environmental history perspective, Afghanistan is defined by the Hindukush mountains and the Amu Darya and Indus rivers. Using geo-somatic imagery we can say the Hindukush forms a diagonal mountain spine through the center of the country, with the Amu Darya and Indus marking northern and southeastern outer limbs, respectively. Just as with the name Afghanistan that subsumes a large assortment of geographic nomenclature across languages and historical eras, each of these three geographic features has been known in full or in parts by a variety of other terms, for example, the Indus is labeled

[1] Foundational works in environmental history include (Cronon 2003; Crosby 1986; Diamond 1997; Pomeranz 2000). Monographs on the environmental history of the Middle East include (Davis 2007; Derr 2019; Mikhail 2017; White 2011). Edited volumes on the environmental history of the Middle East include Albert et. al. (1998), Davis and Burke III (2011), and Mikhail (2013). Monographs on the environmental history of South Asia include (Amrith 2018; Gilmartin 2015; Guha 2013; Roy 1999). Edited volumes on the environmental history of the South Asia include Arnold and R. Guha1996.

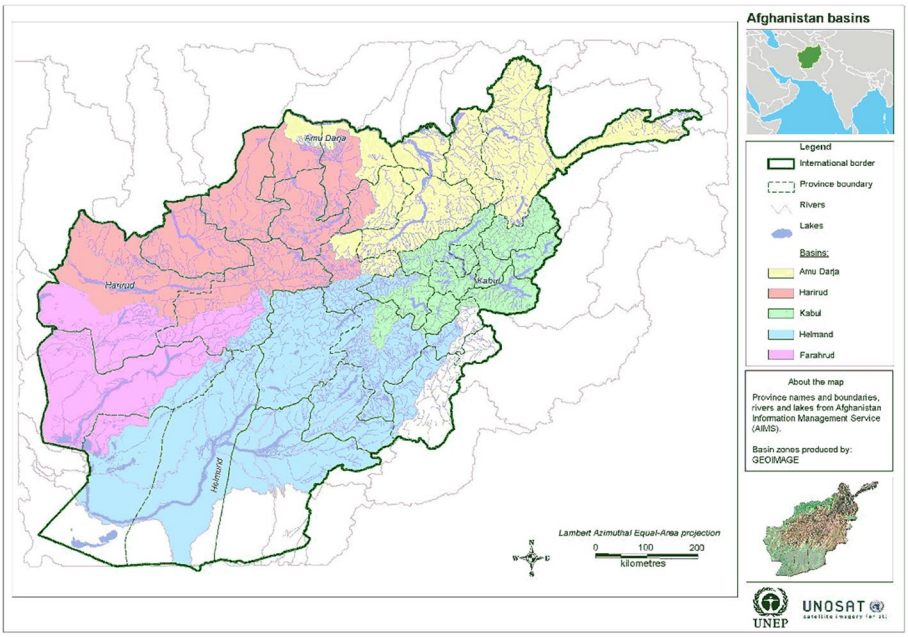

Fig. 1 Afghanistan's River Basins (open source)

Sindhu in Vedic literature, the Amu Darya is referred to as the *Oxus* in classical age texts, and the Hindukush became current in the Islamic era, replacing the classical denominator *Paropamisus*. The Hindukush joins the Pamir, Karakorum and Tien Shan as the dominant mountain ranges of the western Himalayan mountain system.

Originating in the Pamirs, the Amu Darya is Afghanistan's largest river that together with its many tributaries forms the country's most voluminous river basin accounting for over 50% of the Afghanistan's total river flow. The Amu Darya flows to the north-west toward the Aral sea and it forms one section of Afghanistan's northern border with Tajikistan, Uzbekistan and Turkmenistan. With its origin in the central Hindukush, the Kabul river flows easterly through the Kabul and Jalalabad valleys to join the Indus in Pakistan, and the Kabul/Indus river basin accounts for about 25% of Afghanistan's river flow. Accounting for roughly 10% of Afghanistan's total water flow, the Helmand river also originates in the central Hindu Kush and then flows southwesterly toward the Hamun lake and wetlands in Iran. The Harirud originates in the western Hindkush and flows due west before forming part of Afghanistan boundary with Iran. The Hariud river basin sometimes subsumes and other times is distinguished from an arguable fifth Northern River basin associated primarily with the Balkhab or Balkh river (Fig. 1).

No matter whether Afghanistan is said to have four or five river basins, and irrespective of the sometimes conflicting terminology associated with these water bodies, the important points to note here are that each major river basin involves hundreds of rivers, streams and

watershed ecologies, and that in the modern era of nation-states Afghanistan's rivers have been at the center of a multiple high-profile transboundary water controversies.[2]

Modernity

Modern hydraulic engineering projects in Afghanistan originate in the context of the industrial workshops in Kabul begun by Sher Ali (r. 1863–66 and 1868–79) and significantly expanded by Abd al-Rahman (r. 1880–1901) who also initiated the installation of European interior architecture and exterior garden hydraulics.[3] The Kabul workshops or *mashin khana* incorporated steam-driven machinery utilizing water from the Kabul river, timber from Parun in Nuristan, and European, primarily English technologies and technical experts. In the twentieth century Afghanistan's rivers were harnessed for national and international agendas. In the first half of the twentieth century political elites in Kabul increasingly inscribed modern water technologies on Kabul's urban landscape, and in the second half of the century an assortment of international actors aggressively engaged rivers throughout the country under the guise of development.

Abd al-Rahman's son Habibullah (r. 1901–1919) left an enduring impact on the hydraulic environment in Kabul city through commissioning the installation of cast iron and steel pipes to bring water from the Paghman river about twenty miles to the west for storage in the Bala Koh section of the Koh-e Asmai mountain above the Deh Afghanan neighborhood (Schinasi 2017, ch. 4, pp. 89–119). He built a number of modernist palaces replete with European garden pools, ponds, fountains and other hydraulic technologies inside and outside of Kabul, in Jalalabad most notably. In 1908 the Kabul river flooded, demolishing a dam protecting the mashin khana complex, thus threatening to sweep away the country's industrial infrastructure. Three years later, Habibullah hired an American electrical engineer named A. C. Jewett to install a hydroelectric station, Jabal al-Seraj (mountain of light), in the northern reaches of the Kabul valley along the Salang river in the Parwan province, about fifty miles from Kabul city that is located in the southern section of the valley where it is traversed by the Kabul river (Bell 1948). Jabal al-Seraj's purpose was to provide electricity to Kabul's palaces, reception halls and garden compounds that were inspired by Victorian architecture wherein running water for sinks, basins, tubs and toilets rapidly and starkly distinguished the modern urban water customs and habits of dynastic elites from the culture-based water practices of the city's popular classes (Dupree 1988).

Habibullah was assassinated in Jalalabad in 1919, and the accession of his son Amanullah (r. 1919–1929) involved a declaration of Afghanistan's of independence from British India, thus terminating a colonial princely state-like relationship structured by imperial subsidies, various forms of cultural and technocratic patronage, and diplomatic cloistering in return for pseudo-independence. Afghanistan's crypto-colonial status was amplified upon independence by the opening of international patronage prospects beyond those mediated by the British alone. The result was that the waters of Afghanistan became available for international exploitation through the collusion of deceptively autonomous national

[2] Dupree (1973a, b, ch. 2, pp. 33-42) indicates four basins (Amu Darya, Kabul, Helmand, and Harirud,) while Kamal (2004) adds a fifth Northern (non-drainage) river basin.

[3] For Abd al-Rahman, see Hazara (2013), Kakar (1979), and Hanifi (2011) (Part II, pp. 97-174). For narratives of technocrats contracted by Abd al-Rahman, see Gray (1895) and Martin (1907).

elites who became increasingly dependent on multiple sources of external aid (Hanifi and Hanifi 2021).

Nationalization

Independence terminated the British subsidy for the Mohammadzai dynasty, and a primary result of losing this fiscal keystone was that Amanullah inaugurated the structural condition of Afghan state indebtedness to foreign creditors (Fry 1974, p. 156). Losing the imperial line of credit meant that major expenditures created an inescapable structural debt burden for all subsequent rulers and governments. In order of magnitude, these large new expenditures were, first, the military industrial hardware shopping spree Amanullah embarked upon on his much publicized world tour to European (and other) capitals and cities, and secondly for the new architecture through which the Kabuli King intended to legitimize himself and his rapidly secularizing and modernizing rule, unsuccessfully as it turned out in 1929 with his ouster and exile. During Amanullah's rule, the waters of Afghanistan were significantly impacted by the prolific construction of new and refurbishment of existing royal architecture designed and updated to appeal to European aesthetic sensibilities.[4] The most conspicuous articulations of imported modernist hydro-ideology were contextualized by the new stand-alone suburban capital complex about ten miles south of the city center, *Dar ul-Aman*, and a new secondary capital in the Paghman valley and mountain skirts roughly twenty miles to the west of the city that resembled the well-known hill stations of British India such as Mussoorie and Simla. These Euro-modern global showpiece complexes of Dar ul-Aman and Paghman incorporated a variety of interior water provisioning technologies and mechanisms, as well as extensive exterior ponds, pools and garden complexes with diversion canals and electricity driven pumps to supply a plethora of continuous and repeating fountains (Phototheca Afghanica 2023).

Upon independence, Amanullah aggressively marketed Afghanistan as a wide-open, pristine investment site for European cultural and industrial capital that took built material form on land while incorporating and manipulating local waters and elite political aspirations and orientations. These hybridized Euro-modernist aqua-terrestrial projects were mediated by the contracted technocratic expertise of dozens of French, German, Italian, Swiss and other foreign nationals, mediated by hundreds of Afghan state bureaucrats, and executed by thousands of local laborers and their families. For example, the Dar ul-Aman complex including the main namesake palace, the smaller Taj Beg palace, the Museum, additional buildings, bazaar, etc., was constructed using two outsourced teams totaling twenty-two contracted German engineers led by Walter Harten (namesake of Kabul river bridge in the city) and French architects led by Andre Godard who became involved in early French Archaeological Delegation work in Afghanistan before undertaking similar architectural, archaeological and museological activities in Iran (Schinasi 2017, ch 5, pp. 120–151; Gran-Eymerich and Marefat 2001). With independence, the waters of Afghanistan were increasingly subjected to a widening array of inter-imperial, sub-imperial, regional and local forces.

[4] These and a variety of other modern infrastructure installations were linked by paved roads for Amanullah's expanding fleet of automobiles, for which see Green (2013).

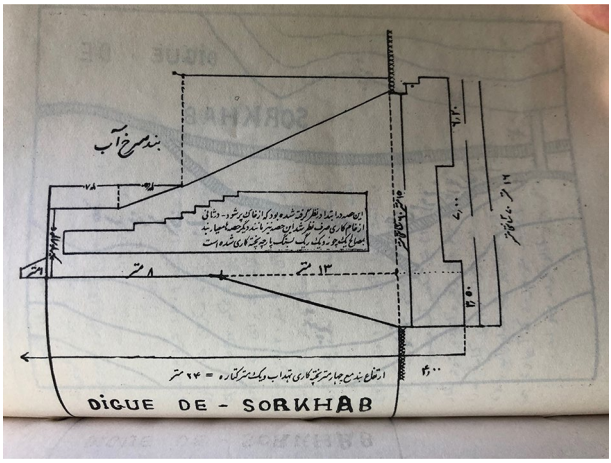

Fig. 2 Band-e Surkhab plans (author copy;no copyright)

Amanullah's transformative political, economic, architectural and infrastructural initiatives were both planned and experimental, as well as alienating to a number of domestic constituencies, particularly in the rural zone (Poullada 1973; Guha 1963). The 1929 uprising that terminated his rule was led by a disaffected villager and former soldier in Amanullah's army who ran afoul of authorities in British India, Habibullah Kalakani, often referred to by a *nom de guerre* of "Bacha-ye Saqqao" or Son of a Water Carrier (Hazara 2019). Whether it was a self-referent or a deprecatory slur, given the social position of water carriers in Kabul, this label reflects a general public consciousness of elite class biases toward local laborers, revealing in more than merely symbolic ways how the Afghan state's aggressive industrial manipulation of Afghanistan's waters flowed into the political, economic and social tensions submerged within Amanullah's modernist development projects during the 1920s.

Afghan governments from the 1930s through the 1970s continued to act at the fast pace and at the large industrial scale established by Amanullah, indeed, it can be argued the state continually sought to expand its technical and economic engagement with the waters of Afghanistan, no matter how that effort had to be materially or politically modified in accordance with shifting local and global conditions. Recognizing high levels of bureaucratic continuity amidst changing heads of state, Habibullah Kalakani retained power in Kabul for less than a year before being deposed and executed by Mohammad Nadir Shah and his British Indian Waziri tribal supporters who ruled from 1929 until his assassination in 1933. Mohammad Nadir Shah's son Mohammad Zahir Shah succeed his father and ruled, however uneasily in conjunction with other personal and institutional loci of power, until 1973. In general terms during this period, Afghanistan's water's continued to be acted upon by a multitude of international actors, among whom Germans were most influential until World War II after which time the American presence was the largest and most consequential.

For an example of German hydro-activity, by 1934 a German-sponsored dam on the Surkhab river in the Logar province bordering Kabul to the southeast, Band-e Surkhab, was near completion. Construction on this dam began through the authority of the Afghan Ministry of Commerce in 1930 and its concluding phases fell under local direction of Mohammad Jan Khan Jabar Khel who appears to have received engineering training in British India, most likely at or through personnel associated with the Thomason College of Civil

Engineering (now the Indian Institute of Technology) at Roorkee.[5] In 1935, the Ministry of Commerce officially announced Mohammad Jan Khan as well as new Directors at the Qargha dam on the Paghman river (see below) and at another dam in Logar, the Kharwar dam. That year the Afghan Government announced the arrival of five foreign technocrats in Kabul, three of whom were described as Engineers of Rivers and Dams, namely, the Italians Francisco Uropo and Morabino and the Japanese Tajeo Akimoto. These announcements appear in the primary and most historically valuable twentieth-century Afghan government serial publication, the *Salnama* or Annual Almanac series.[6] In the 1936 Salnama, these three and a fourth dam (Machalghu) are statistically enumerated (the Surkhab dam being 114 m long, 40 m tall, and many other measurements) and visualized through technical landscape engineering survey drawings (Fig. 2).

In this volume we also find some of the first crypto-colonially independent Afghan government statements on Kabul's gardens and irrigated surroundings. For example, in the Mughal Empire's founder Mohammad Zahir ud-Din Babur's gravesite gardens in Kabul where 300 Japanese fruit trees were planted and Babur's famously renovated gardens in Islatif where Japanese pesticides were applied via the a Japanese agriculture specialist named Uzaki who arrived the previous year (Reshtiya 1935–1936, pp. 119–133).

Nadir Shah de-emphasized Paghman as a state political space, for example by transferring the annual independence celebrations or *Jashns* to Kabul city. However, the Paghman river became a primary object of hydrologic emphasis for the political elite class. It was dammed to create the Qargha reservoir and by the end of the decade the city benefitted from an officially reported 1200 metered taps providing piped water from Paghman/Qargha to government buildings, royal places and elite residential areas, primarily. It is unclear how many taps or what proportion of Paghman water supplied the 41 hammams or public baths in the city in 1938–39, or any of the mosques and shrines that were then and now remain primary reference points for locals for reasons including both water as a resource for sustenance and purification, but also as potent symbolic carrier of fertility, health, and prosperity.[7]

In 1932, Nadir Shah's government dispatched an inaugural group of five engineering and medical students to the United States, among whom Muhammad Kabir Ludin received an undergraduate degree prior to earning a Master's in Civil Engineering from Cornell University in 1938 (Ludin 1938). Ludin's MA Thesis is a survey of technical literature on irrigation technology, and his studies in the US were scientifically and politically contextualized by the Tennessee Valley Authority (TVA) that was launched in 1933 as one of the key agencies of US President Franklin D. Roosevelt's New Deal projects to vitalize the American economy during the Great Depression of the 1930s that had global ramifications, including in Afghanistan. The Chickamauga Dam near Chattanooga was the main dam for the TVA, and the New Deal included a large number of other major proximate

[5] For a photo of Mohammad Jan Khan Jabar Khel in the context of announcing new appointments in the Ministry of Commerce, see Reshtiya (1935–36, pp. 104–105).

[6] The Salnama series that began in 1932 is a crypto-colonial artifact modeled on European narrative structures and visual aesthetics in the encyclopedia tradition. The Salnama series was designed for state consumption and public circulation. The Salnamas are also referred to as the *Almanach de Kaboul* in its early years and beginning in the approximately the late 1940s as *Da Kabul Kalanay*.

[7] For the Paghman water taps and hamman numbers in Kabul city, see Schinasi (2017), ch. 6, pp. 152-193. For more on the long-term history and shifting cultural meanings of water in Afghanistan, see SM Hanifi (forthcoming) "A Deep History of Water in Afghanistan," chapter in *An Environmental History of Afghanistan: Mountains, Rivers, Animals Food, and Climate*.

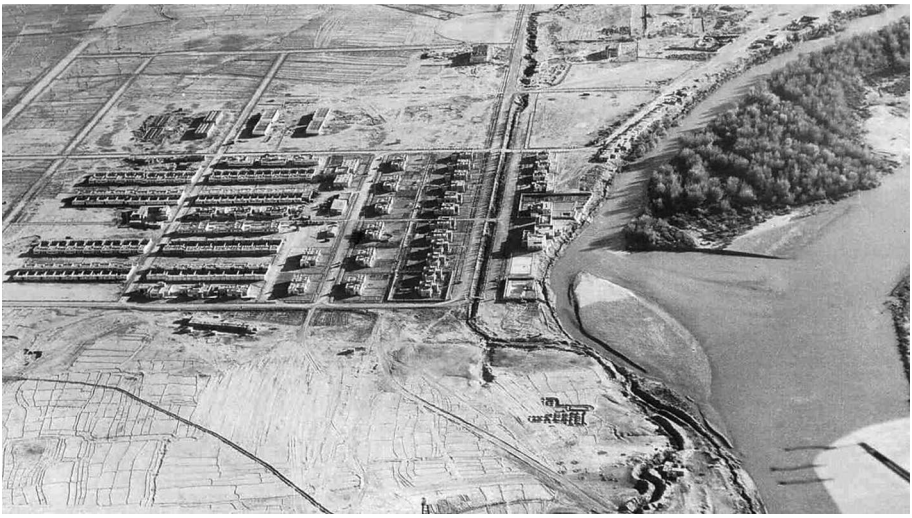

Fig. 3 Lashkar Gah 1957 (https://www.bbc.co.uk/programmes/p00pm13l)

and distant dam and complementary infrastructure (e.g., reservoirs, canals, roads, bridges, railroads, and electricity lines) projects, most prominent being the Hoover Dam that was completed in 1936. The Bureau of Land Reclamation played a central role in New Deal dam/hydro-electric powerplant/canal projects in the Western United States, and today it is the second largest provisioner of wholesale water in the US. Upon completing his MA at Cornell, Ludin worked with the Bureau of Land Reclamation before returning home to become the Minister of Public Works, Deputy Director of the Helmand Valley Association (see below), and then Ambassador to the US from 1953–1956, to the United Kingdom (1957–1960), and India (1964–1966), among other positions.

World War II shifted global power dynamics dramatically, with the rapid extension in the range and depth of US interactions with nation-states in Asia, Africa and the Middle East being arguably the most tangible effect, and not just for Afghanistan. A primary policy vehicle for the global expansion of US interests after the war was the Point IV Program President Harry S. Turman announced in 1949 that made development aid the principal plank in US foreign policy toward new nation-states in the Global South particularly. Point IV spawned the Technical Cooperation Association (1950) that turned into the Foreign Operations Administration (1953) which became the International Cooperation Administration (1955) prior to assuming its current label as the United States Agency for International Development (USAID) in 1961. Large hydro-electric dams modeled on the TVA were a priority within Point IV-based agendas for many countries around the world, and each of the Six Companies of the conglomerate organized to complete the Hoover Dam received major contracts from TCA/FOA/ICA/USAID during the Cold War. Morrison-Knudsen (MK) was one of those companies that gained inter-war domestic prominence through work on the Hoover dam, as well as the San Francisco Bay bridge that was also completed in 1936. Working with the Export–Import Bank that was created to leverage foreign commerce for Roosevelt's New Deal objectives, MK received contracts for dam and related infrastructure work around the world and began work on damming the Helmand river in southern Afghanistan in 1946. MK rapidly grew to become not only a "state within a state" but also "nation within a nation" or *Little America* as MK's civilian center

in Lashkar Gah came to be known (Chandrasekaran 2013, ch. 1, pp. 15–33; Jones 1956) (Fig. 3).

Internationalization

To coordinate the financing and local logistics of MK's dam and development work, the Afghan government created the Helmand Valley Authority (HVA) in 1952. This agency was modeled on the TVA and its authority grew to include the Arghandab river valley in 1965 (thusly, HAVA).[8] The entire project centered on two hydroelectric dams, the Kajaki dam on the Helmand river about 115 miles west and north from Qandahar, and the Dahla/Arghandab dam on the Arghandab, the Helmand's major tributary, about 15 miles north of Qandahar. In addition to the two main hydroelectric dams and their reservoirs, a series of diversion dams, canals, embankments, roads and an airport formed the industrial infrastructure of HAVA. The project was designed to induced nomads to settle and become stationary cotton export cash crop farmers with access to technologies like tractors and social services like hospitals and schools, and paths of mobility via jet airplanes and a new airport in Qandahar, all of which rapidly and dramatically transformed local livelihood strategies and forms of social, economic and political organization (Cullather 2002; Van Vleck 2009. The entire big dam-based socio-economic industrial development project was conceived to be in service of Afghan state interests during the Cold War that were organized and also convoluted by advocacy for a separate state of Pashtunistan to include Pashto-speakers in Pakistan, but not for those in Afghanistan, by the Persian speaking Kabuli political elite (SM Hanifi 2022a, b, c). The stark cultural contradiction organizing the Pashtunistan project for Afghan state officials is politically akin to the scientific failure at core of MK's work in southern Afghanistan. The fundamental problem that undermined MK's entire effort was scientific, ironically, in that a lack of proper basic standard soil and groundwater surveys at the start of the project that resulted in immediate and intense salinization of the soil, ultimately rendering the perennially irrigated land ill-suited for few crops besides opium, much as the Afghan state's inability to see beyond ethnic frames of reference is a foundational flaw in the crypto-colonial national body politic.[9]

Seen in the artificial cultural light of Pashtunistan, it is historically revealing that Pashto-speaking Afghans were the vanguard of the revolution that terminated the Persianate Mohammadzai dynasty. The April 1978 revolution began a fourteen-year period of socialist governance in Afghanistan that prioritized rural land reform, thus significantly destabilizing property rights and access to water for rural communities including both sedentary agriculturalists and pastoral nomads. In July 1979, between January's Islamic Revolution in Iran and December's Soviet invasion of Afghanistan, the US Central Intelligence Agency launched Operation Cyclone as the covert mechanism for materially and ideologically arming the Afghan Islamist mujahideen against socialist rule in Afghanistan,

[8] On MK and HAVA in Afghanistan, see Duran (2013), Michel (1959, 1972), Morrison Knudsen (1957), Perkins and Culbertson (1970), Shorish (1968), and Westfall (1969). The HAVA and MK presence in Afghanistan intersected with the TVA in the US administrative arena, but also in the context of the post-colonial nationalization of rivers in South Asia, for which see Haines (2014), Aijaz and Akhter (2021), Alam (2002), Hayat (2018), Klingensmith (2007), Michel (1967), Ranjan (2016), and Tucker (2010).

[9] For critiques of ethnicity as the singular, limiting pathway for knowing and acting on Afghanistan and Afghan society, see SM Hanifi (2012, 2016).

a program that worked in close coordination with Pakistan's Inter-Service Intelligence and Saudia Arabia's General Intelligence Directorate. The large-scale provisioning of landmines to the mujahideen resulted in decreasing agricultural productivity and increasing dilapidation of irrigation systems involving canals, wells, dams and karez in the east and south of the country that, most detrimentally, became primary military targets for Soviet, Afghan national and mujahideen combatants. With the important exception of generally consistently expanding opium production, military conflict in Afghanistan from 1979 to 1996 carried profoundly detrimental impacts on agricultural productivity and the hydraulic infrastructure (McCoy 2003, ch. 9, pp. 461–531). The 1992–1996 Civil War trend toward societal collapse was interrupted during Taliban rule from 1996–2001. Despite their covert coercive operations origin in the bowels of CIA-ISI-GIP/GIPD collaborative plumbing, the criminal executions that marked the Taliban's assumption of power in Kabul, and the overextension of Islamic legal principles that characterized their first rule in Afghanistan, agro-hydraulic highlights of the Taliban social rehabilitation agenda included the eradication of opium production in 2000 by which time they had also repaired the Kajaki dam power plant that delivered electricity to Qandahar city, an infrastructure grid connection made for the very first time in the Helmand valley.[10]

Militarization

From October 2001 to August 2021, a US-led international coalition and its alter-armies of covert operators and military contractor-mercenary forces perpetually bombed an array of human and material targets in Afghanistan. For twenty years, every available explosive including new kinds of increasingly lethal bombs (Bunker Busters, the Mother of all Bombs, etc.) were delivered upon local populations and landscapes from every available aerial vehicle including new generations of killer drones (Predator, Reaper, etc.). These lethal technologies are products of a deeply entrenched military industrial complex and expanding corporate military culture in the US that they have caused unquantifiable damage to fragile ecosystems and habitats maintained by sophisticated technology complexes in Afghanistan that combine ancient underground karez, medieval and early modern irrigation canals and urban water supply systems, and modern dams.[11] Because Qandahar functions as a spiritual capital for the Taliban and the villages and settlements sustained by the Arghandab and Helmand rivers provide a strong social basis for the movement, the region covered by HAVA became arguably the most active combat zone throughout the war. Indeed, new agricultural settlements brought into existence through MK and HAVA such as Marja and Nad-e Ali became among the most notorious killing fields of the international war in Afghanistan.

A steady twenty-year rain of bombs began to fall in Afghanistan beginning in October 2001 when the ancient karez network surrounding Qandahar became a subterranean zone of refuge for Taliban fighters and thus a primary target of intense retributive US aerial bombardment. The Kajaki dam and powerhouse along the Helmand river were destroyed by an aerial explosive storm in November, and in December an intense wintry blizzard of bombs befell the Tora Bora (Black Cave) cave complex in the Spin Ghar (White Mountain)

[10] The Taliban have an alternating record of prohibiting and allowing various stages of opium production, processing, consumption and transport for export.

[11] For a global historical survey of the environmental impacts of war, see Tucker (2012).

mountain range watershed between the Kabul and Kurram rivers in Nangarhar (Jalabad) province, a mere six miles or so from the Pakistan border. The extensive natural cave complex of Tora Bora formed over geologic time by montane gullies, streams and rivers that form and course through the relatively soft limestone was an organically unique strategic locale that was industrially developed by the CIA and Osama bin Laden during the Soviet occupation.[12] In sum, the first months of war entailed widespread, intensive, indeed, record-setting bombing in the Helmand and Arghandab river basins surrounding Qandahar in southern Afghanistan, and in the Tora Bora mountains near Jalalabad where rivers and tributaries of the Kabul river merge before joining the mighty Indus.

Aerial bombardment during the first months of the twenty-year war resulted in the loss of countless innocent lives, and the unquantifiable destruction of hydraulic infrastructure (canals, dams, karez and wells), moveable capital (animals, vehicles, tools) and stationary property (homes, trees, gardens) throughout the well irrigated and relatively densely populated east and south of the country. Bombing in the east and south was directed at targets moving on land, via irrigation canals, underground via karez, or within mountains via cave networks, as well as stationary infrastructure including dams, bridges, and water-driven mills. In all areas of Afghanistan—urban, rural and montane—the preferred more powerful munitions used to inflict maximal kinetic effect contained depleted uranium (DU) that necessarily seeps into the country's water supply system. For Afghanistan's waters that flow determinatively into local inhabitants' life courses and livelihood strategies and carry transnational implications, the DU content in all ordnance but especially in air-delivered bombs is the most environmentally disconcerting consequence of the twenty-year US-led Global War on Terror in the country.[13]

The impact of DU laced munitions and DU enforced war materiel more generally on the waters and population of Afghanistan is part of a larger global history commonly dated to the World Wars, with the World War I use of industrially produced poisonous gases and the introduction of nuclear weapons in World War II (Tucker et al. 2018; McNeill and Unger 2010). It is now widely recognized that the development and deployment of such chemical and nuclear weapons leaves serious lifelong health consequences for exposed soldiers and civilians, as well posing broader and longer-term multigenerational damage or slow violence to surrounding environments and ecosystems through topsoil and groundwater contamination. However, detailed and contentious debates consistently arise over the quantification of variables, scope of sample sizes, and precise causation between exposure and disease manifestation among communities of military veterans, on the one hand, and locally impacted residents, on the other hand, with veterans' claims and compensatory legal recognition often preceding legal validation and compensation for effected local populations. The historically repetitive interpretive tension over the environmental and human costs of modern war pits primarily military and other government scientists and lawyers upholding metropolitan status quo norms against impacted local community members and leaders, investigative journalists, human rights advocates and environmental

[12] For Tora Bora, see Hadden (2005). For the CIA and Osama bin Laden see Coll (2004) and Schuer (2005).

[13] For transnational waters, see Ahmadzi and McKinna (2018), Atef et al. (2019), Iqbal (2020), Shroder and Ahmadzai (2016), and Yousefi et al. (2017). For the impact depleted uranium, landmines and cluster bombs on Iraqis, Afghans and Americans since the first Gulf War see Nixon 2011, ch. 7, pp. 199-132 (the title of Nixon's book borrows from Martinez-Alier 2002). For an environment-based repudiation of US military conduct in Afghanistan, see Hanifi (2022a, b, c) SAAG.

activists who experience and/or represent the hidden victims of such weapons and their restitutive class-action interests. The history of US international warfare contains many examples of scientific tension about the impacts of war on the environment and health of soldiers and civilians that in turn structures national and international legal arguments for and against compensation claims. These include successful legal claims by US veterans and local populations in the Marshall Islands where 67 nuclear bomb tests were conducted from 1946 to 1958 and where the aquatic ecosystem and groundwater supplies remain dangerously radiated, and in Vietnam where from 1961 to 1971 twelve million gallons of the defoliant Agent Orange were aerially sprayed along the Mekong riverbanks in particular where birth defects and cancers are still gravely evident today. From 1945 to 1992 the US conducted 1,054 nuclear bomb tests (approximately 1/4 in lower case of which have been atmospheric and ¾ subterranean or aquatic), and in 2023 there were 93 active nuclear reactors in the US, and between 410–450 functioning worldwide. Both nuclear power generation and nuclear weapons production generate DU as a byproduct, and DU has been used in US bullets and mortars and to reinforce miliary vehicles since the 1970s. The use of DU in US military ordnance began to attract global attention in the 1990s with conflicts that gave rise to mystery illnesses named "Gulf War Syndrome" and "Balkans Syndrome" which became increasingly evident among US military veterans of those conflicts (Peterson 2000). These mystery syndromes involve many of the same symptoms associated with DU exposure. The use of DU and other radioactive pollutants such as thorium was more extensive during the second US occupation of Iraq (2003–2011), resulting in conspicuously increased cancers and birth defects in Fallujah astride the Euphrates river and the Balad airbase along the Tigris river. In these and other locations in Iraq, especially in settlements along the Tigris and Euphrates, a familiar litany of birth defects and deformities (fused legs or 'fish tails'; missing, misplaced and distorted limbs; external organs; 'snake skin', etc.), leukemia and other cancers, and adverse health effects including significant respiratory changes, persistent dry coughing, chest pains, gastrointestinal and neurological symptoms, memory loss, anxiety, depression other neuropsychiatric disorders, incapacitating fatigue, excruciating muscular and skeletal pain, and visual imparities, at least, are well documented (Rubaii 2020).

Compared to Iraq, the literature on DU in Afghanistan after 2001 is more scarce and appears to be more heavily subjected to political censorship and military science propaganda.[14] The vastly smaller volume of literature on the environmental consequences of war in Afghanistan results in very little attention to the severe long-term problem of DU and other toxins and carcinogens in the air, soil, and waters of the country. In coordination with the US military, the Uranium Medical Research Center sent research teams to Jalalabad in June 2002, and a second team in the fall that worked in Kabul. In Jalalabad, UMRC took soil samples from bomb sites and urine samples from inhabitants with varying exposures to those incidents and locations. Through a variety of tests, they found levels of DU and uranium isotopes to be exceedingly far above normal (from c. 57% to c. 200%) in the soil near bomb sites, in urine samples of local inhabitants near bomb sites, and in drinking water samples throughout the east. In Kabul, UMRC found inhabitants near bomb sites exhibiting symptoms familiar to the team through experience with Gulf War Syndrome, effects that in fact became noticeable among the team itself while in the city. They also note a random sample in one hospital where 25% of infants exhibited congenital deformities or post-natal

[14] See, for example, Koto et al. (2016), and Tanha et al. (2019).

symptoms consistent with uranium contamination (Durakovic 2001, 2003, 2005; Ehrlich 2001; Williams 2001). Widespread, chronic respiratory illness as well as increasingly prevalent birth defects were captured in a 2006 Canadian documentary film that includes video from inside a hospital maternity ward (SM Hanifi 2014). Since then, the information management system about the environmental consequences of the US-led international war in Afghanistan generally and involving DU contamination specifically tightened to render these realities fundamentally invisible in the academies and media of the Global North. The same holds true for sources of official information in Afghanistan, as evinced in 2019 when officials at Afghanistan's International Atomic Agency Office in Kabul informed me of their charge being to investigate DU contamination *only* insofar as it concerned leakage from destroyed Soviet war materiel.

During the Global War on Terror, the US maintained at least six military bases and 12 of 25 International Provincial Reconstruction Teams (PRTs), as well as an unknown number of secret bases or "Black Sites" throughout Afghanistan, with concentrations in the east and south of the country. Inescapably parallel to the 500 + military bases in US territory and 700+ international bases, and unknown number of clandestine "Lily Pads" and other "Special Operations" staging areas across the globe, these installations were and remain profligate polluters of the waters and wider environments around them (Wegman and Bailey 1994). The most environmentally detrimental aspect of US military bases in Afghanistan were their noxious burn pits used to eliminate the full spectrum of material waste and evidence of their presence including papers, plastics, metals, chemicals, paints, organic and inorganic medical waste, human waste, clothing, fuels and oils, tires and other rubbers, aerosols, ammunitions, etc. Burn pits release a variety of toxins and carcinogens into the air, surrounding topsoil and regional water systems. Most notorious of the 221 confirmed US military burn pits in Afghanistan was that at the main Bagram airbase where a burn pit ranging in size from two to perhaps five acres perpetually burned and smoldered for nearly twenty years.[15] Bagram is in the northern reaches of the Kabul valley where the Ghorband river joins the Panjshir river before merging with the Kabul river that courses into the mighty Indus prior to debouching c. 900 miles to the south into the Indian Ocean, and so the hazardous particles contained in the burn pit's toxic fumes and smoke are deposited in the local soil and groundwater and circulated trans-locally through much of the Kabul and Indus river basins.[16]

Elsewhere in the preponderant rural zone of Afghanistan, US military bases, PRTs, CIA and Special Operations Blacksites were all profuse polluters of their local environments generally and waters specifically. It must be emphasized that the rural zone in Afghanistan bore the brunt of vengefully extreme and increasingly experimental bombing. Beyond unexploded ordnance and toxic remnants of spent munitions, the discharge of immense

[15] A Veteran's Law firm indicated at least 221 burn pits in Afghanistan (Berry Law 2021). For a military view of this more-than-military problem, see Kyle (2013).

[16] There has been voluminous academic, political and popular writing on water in Afghanistan since 2001. Literature on the Kabul river and basin includes Broshears et al. (2005), Habib (2014), Karim (2018), Mack et al. (2010), Mack et al. (2013), Najmuddin et al. (2017), and US Department of Interior and Geological Survey (2005). A sampling of post-2001 literature on the water more generally in Afghanistan includes Acquah and Ward 2019, Danesh et al. 2017, Ebner et al. 2018, Habib et al. 2013, Hallet 2009, Hayat and Baba 2017, Islamic Republic of Afghanistan 2008, Japan International Cooperation Agency 2011 and 2016, King and Sturtewagen 2010, Mansfield 2020, Pervez et al. 2014, Reeling et al. 2012, Reich and Pearson 2012, Rout 2008, Sanyu 2004, Shroder 2016, Thomas and Ahmad 2009, Vining and Vecchia 2007, Walters and Groninger 2014, Ward, Amer and Ziaee 2012.

quantities of other military wastes including foams, fuels and oils, has left voluminous and mortally perilous pollutants in the soils and waters of Afghanistan. The international humanitarian activity subordinated to global war making in Afghanistan engaged the country's waters and river basin environments whereby the policies and sciences of nation-building and economic development generated a frenzy of damming and canaling that became part of the terrain of counterinsurgency operations. The distorting overconfidence in technological solutions to human problems reified the violent and violating colonial episteme of historical recovery and ethnic apportionment, all of which combine to resemble expressions of environmental orientalism found in other imperial hydraulic contexts such as the British Mandate in Palestine.[17]

The US Global War on Terror projected DU and burn pit poisons into the air, soil and waters of Afghanistan. Concurrently in subordination to military objectives determined through US national interests that were internationalized through NATO, at the curiously occupied-but-independent Afghan national political level, the Hamid Karzai (2004–2014) and Ashraf Ghani (2014–2021) regimes exhibited the same internationally supported big dam fetish as Mohammadzai dynasts did in the twentieth century (Packer 2016). As a technocrat himself, Ghani was particularly enamored by the prospect of industrial development in Afghanistan, and he sought international investors and sponsors for a variety of large-scale projects predicated on hydraulic engineering. Among the most prominent of Ghani's projects was the completion of a dam on the Harirud river in the western terminus of the Hindukush near the village Chisht. Construction on the Salma dam that began in the mid-1970s was interrupted by ensuing decades of political and military conflict. Soon after coming to office on an imperial historic template of staged elections, Ghani struck a deal with Narendra Modi, leader of India's ruling Hindu nationalist Islamophobic Bharata Janata Party (BJP), and the Salma dam was finally completed and renamed "The Afghan-India Friendship Dam" in 2016.

Regarding hydraulic developments in the urban capital city space of Kabul, in 2014 the Ghani government received USAID and German Development Bank (KfW) support for a much celebrated three-year $82 million drinking water purification system for 87,000 residents. This works out to be about $1 million for 1000 people. This project was completed in 2020, and whether cost-effective or not, it serves only a fraction of the city's approximately 5 million inhabitants (USAID 2020). The Ghani government also contracted with the US-based Sasaki Associates for a Kabul Urban Design Framework that established "a vision and a roadmap for transforming the city into a model of sustainable, equitable and resilient development" (Sasaki Kabul Urban Design; Sasaki Five Cities). The design was completed in 2018 and it is presented in a visually appealing way in digital form wherein 4 of 29 attractive slides with concise bullet point statements highlight the city's water supply, local wetland rehabilitation and ecological restoration. Ghani lauded it as the culmination

[17] My use of the phrase environmental orientalism derives from Broich (2013). Examples of attempting to recover the past vitality of qanat and karez systems in service of neo-imperial objectives include Goes et al. (2017), Himat and Dogan (2017), Macpherson et al. (2017), Khan et al. (2015), Taghavi-Jeloudar et al. (2013). For the US application of remote sensing technology to karez/qanat systems in Afghanistan, and the use of other technologies and technology more generally by the US in Afghanistan since 2001, see Egitto (2013), Stinson et al. (2016), Karaucak et al. (2021), Tiwari (2020), and Peace and Kuzmarov (2022). See the Natural Resources section of Afghanistan Research and Evaluation Unit website (https://areu.org.af/natural-resource-management/) for dozens of water policy related papers published between 2001 and 2021 that are contextualized by overriding concerns with insurgency, security and governance for a militarily occupied and un-self-sustainable state structure.

of his own dream for the city. Conspicuously enough for a blind person to see in Sasaki's vision of Kabul is the absence of any central municipal sanitation or sewage component for a city that is leaking waste out of its own skin to be metaphorically graphic. Furthermore, as far as can be determined, there is no plan to address the relentless draining of the city's aquifers by unregulated and unlimited private electrical well drilling and pumping (Saffi 2019). Kabul is drowning in human waste while being dehydrated with scarce remaining waters contaminated with DU and other toxins. There is no imperial or national plan of immediate remediation for these war-driven ill-effects on Kabul's historically renown waters.

In sum, we have seen that upon independence in 1919, the waters of Afghanistan had already been affected in minor ways by a small but influential handful of international, primarily Anglophone technocrats for nearly forty years. This metaphorical trickle of small-scale actors became a stream of much more influential international agents during Amanullah's reign. After World War II the stream turned into a deluge of impactful non-Afghan actors on Afghan water, among whom Americans were most prominent. Between 2001 and 2021, a tidal wave of global 'hydro-agents' led by the US manipulated Afghan waters in subordinated support of international military objectives. The Taliban re-assumed control of the governmental machinery in Kabul in 2021, and while the cessation of war is inherently positive, the daily life conditions for ordinary, popular classes of Afghans has not dramatically changed. The most notable impact the Taliban have had on the waters of Afghanistan has been the construction of the Qosh Tepa mega-canal project that siphons water from the Amu Darya.

The aquatic basis of survival for Afghan people in all ecosystems in the country is now on the precipice of irrecoverable disaster due to international warfare and political mismanagement. The international military factors that have so negatively impacting the country's waters over recent decades have been compounded by droughts, floods and deglaciation precipitated by global climate change that have had an acute impact on the fragile environments and the vulnerable inhabitants of Afghanistan. To stem this historical tide and begin the systematic remediation of the country's water supply that is necessary for self-sustaining agricultural production and overall ecological recuperation, a number of national and international steps need to be taken.

Reclaiming the Afghan people's right to the water of Afghanistan

A glance at the long-term history of Afghanistan's waters reveals them to be significantly influenced by cultural and material technologies from South, Central and Southwest Asia.[18] The Amu Darya in the north is historically associated with the Avesta and Zoroastrianism, Persian civilization and Persianate culture. The Indus river marks the southeast geographic perimeter of the historical space that became Afghanistan, and through the waters of the Indus, Vedic civilization and Indic culture flowed into geographic terrain that became Afghanistan. Islamic hydrological influences entered Afghanistan from the west and accommodated themselves, via a bridge of Chishti Sufism emanating from Herat along the Harirud river, to the cultural waters of Delhi and Hindustan north India via the rivers of the Punjab and the Ganges. The rich hydraulic epistemology that Islam inherited

[18] For these long-term historical developments, see Hanifi forthcoming.

(e.g., water *sadaqa* or charity) and elaborated on (e.g., in the Quran and the *Shariah* or Islamic Law) left an inexorable historical mark on the geographic space that became Afghanistan. From the hydrological marvels in urban Ghazni in the east, to the splendors of rural canal-fed Lashkari Bazaar (c. ancient Bust, modern Lashkar Gah) near the conflux of the Arghandab and Helmand rivers in the south roughly one thousand years ago, to the remarkable Char Suq Bazaar with its copious cistern and extensive canalization in and around Herat, the renowned "Pearl of Khorasan" in the west that flourished under Timurid rule roughly five hundred years ago, and the subsequent roughly three centuries of growth of Balkh and Mazar-e Sharif with their sophisticated shrine-based municipal water works surrounded by the wonderous *hazda nahr* or eighteen-canal system in the north, Islamic state formation in Afghanistan produced these and hundreds of other hydraulic heritage sites.[19] While it is clearly the case that the concept of *Afghan* emerged during these centuries of Persianate Islamic immersion in the medieval and pre-modern periods that were characterized by very different forms of spatial mobility, cultural connectivity and political organization than the modern era (and remains a dynamic, at times contested label in relation to a number of other socio-cultural-political categories today), there appears to have been a high level of local communal investments in those pre-modern systems of power and authority.

Two subsequent periods are overlain upon this multi-millennial, multi-civilizational, multi-imperial, and multi-cultural aquatic history of a "landlocked" country. The first is imperialism over the course of the long-nineteenth century, in which context trans-oceanic British colonialism in South Asia had a determinative and definitional impact on the territorial configuration of Afghanistan, and socio-political relations within and surrounding it.[20] The space that became Afghanistan emerged within a larger set of inter-imperial processes that were in many ways organized and articulated around projects envisioned for the the Amu Darya and Indus rivers. Thereafter, beginning with the illusion of independence in 1919, Afghanistan experienced roughly a century of national hydraulic development agendas and nearly fifty years of international war-making agencies that have focused primarily on the Helmand and Kabul rivers, the former debouching in Iran, the latter a tributary of the exponentially larger Indus basin system.

The water history of Afghanistan in the modern era has involved a substantial shift in power relations from the pre-modern era when there was a considerably different spatial context and temporal cadence to the economic and social contact between locals and political authorities. In the modern era, a relatively small number of political elites here termed crypto-colonial state authorities ensconced in Kabul typically had more exposure and interest in the world beyond Afghanistan than the worlds beyond Kabul in Afghanistan. In the modern era, state-society relations in Afghanistan that are in many ways mediated by water, have experienced a shift whereby an Islamicate and Persianate cultural formation organized by an established system of ethics (*akhlaq*) and humanity (*insaniyyat*) that placed a premium on patience and tolerance gave way to an ideology of capitalism with its expedited maximalist individual profit-driven ethos with a shift in impactful key decisions about war and peace increasingly being made in and for metropolitan cores that led to the peripheralization of Afghanistan.

[19] See MJ Hanifi for the origin of the term *Afghan*, and McChesney (1991, 2021) for Balkh, Mazar-e Sharif, and the Hazda Nahr canal system.

[20] See Hanifi (2022a, b, c) for the impact of the map on Afghanistan.

In pursuit of environmental and social justice for the increasingly dehydrated and malnourished Afghan populace who have been subjected to global hyper-militarization, present and future political authorities with legal custodianship over the waters of Afghanistan must first systematically aggregate a national hydraulic data set that contains qualitative details about local drinking water supplies, volumes of water for agricultural irrigation and the social mechanisms for its distribution and hydraulic infrastructure (canals and dams), at least. One aspect of the information gathered about water-use and livelihood strategies must be hydraulic degradation since 2001 when aerial bombardment jumped scale in relation to Soviet aerial bombing in terms of volume and qualitative strength of explosive impacts due to DU infusion, as well as the geographic scope, duration, and temporal regularity of the bombing campaign. The organizational principle for this national survey should be to identify shared problems and find common solutions across localities regarding water use throughout the country. The dissemination of survey information should occur through print and digital media, radio, television, and through educational institutions that must immediately begin to incorporate environmental studies in tiered and coordinated ways. This information circulation must target the popular classes, women and children especially, to create a holistic national hydraulic consciousness. Building upon Afghanistan's Islamicate and Persianate heritage, the Taliban are politically and ethically well-positioned to mobilize the Afghan populace around this collective water accountability, responsibility, and restorative agenda by, for example, invoking the Islamic concept of *maslaha* or the greater public good that can be activated and amplified as a macro-organizing communal survival bond (Gade 2019, ch. 4, pp. 118–157). Such shared historical consciousness and water knowledge will lead to environmental alliances that transcend political divides, and in this regard the people of Afghanistan can learn from other popular environmental justice movements in Asia, Africa and the Americas.[21]

The international actors responsible for harming Afghanistan's waters need to be held accountable, and in this regard the collusion between external state and non-state, overt and covert actors and an array of Afghan authorities commonly working at a variety of cross purposes to the detriment of Afghanistan's environment and natural resource base cannot be overlooked. From 2001–2021 the US was paramount in the dense web of local and global hydro-agents acting on water that sustains the Afghan people, and as such US authorities bear primary responsibility for the pervasive destruction of hydraulic infrastructure and pollution of groundwater, topsoil and air with toxins, carcinogens, forever chemicals and depleted uranium. Because the International Criminal Court has decided not to pursue cases regarding Afghanistan, the push for accountability and restitution concerning the military degradation of the environment must come from within Afghanistan as well as the US, NATO member countries, and through international institutions such as the United Nations.

In the US, far more needs to be done by politicians, journalists and academics to surmount the prevailing censorship regarding the US military conduct (overt and covert; covert operations proliferated exponentially during the Global War on Terror) in Afghanistan.

[21] For an example of collective environmental consciousness contributing to conflict resolution elsewhere in the Muslim World, see Zabara and Zumbragel 2022. The most proximate and prominent comparative case study that has the potential to positively impact emerging environmental justice movements in Afghanistan is Chipko movement in the forested region of Uttarakhand in the North Indian Himalayas made famous by Ramachandra Guha's Unquiet Woods (op. cit.). For a sampling of environmental justice movements elsewhere in India, Asia, Africa and the Americas, see Basu (2017), MacDonald (2017), Carruthers (2022), and Bullard (2000).

For the US military and political elites to admit errors and excesses in Afghanistan, there must be sustained activism founded on an awareness campaign designed to generate the civil and social will leading to corporate lawsuits resulting in the release of exponentially more of the overt and covert data about the forms of war made there, particularly regarding when and where particular volumes and types of DU-infused ordnance was deployed. Historical roadmaps for breaching security and classification barriers can be found in the history of how the US ultimately provided compensatory funding to US soldiers and civilians effected by nuclear testing ("Atomic Veterans" and "Downwinders," respectively), to US veterans exposed to the poisonous Agent Orange in Viet Nam, to the Government of Vietnam, to US veterans impacted by DU and other toxins and carcinogens leading to Gulf War Syndrome, and most recently to the US military service people living with cancers, respiratory, mobility, speech and cognitive disorders resulting from burn pits scarring the terrain of the Global War on Terror in Afghanistan and Iraq. Thus far, the necessary discussions about advocacy for compensation or reparations for the decimation of Afghanistan's water supply has not happened, but it needs to being immediately. The eventual compensation for the Afghan people should go into an Afghanistan Water Trust Fund and be replenished every five years for 25 years, and then renewed pending successful outcomes. The compensatory endowment should be funded by the US and NATO and administered by the United Nations in accordance with that global body's declarations of human rights to drinking water (2010), water for sanitation (2015), and a clean, healthy and sustainable environment (2022), and each of Afghanistan's neighbors sharing transboundary waters. This will reposition the UN as a vanguard of the global environmental justice movement, thus enhancing the global clout and regional credibility of the UN at a time when its legitimacy and impact are being questioned, while providing the people of Afghanistan global reparations for their environmental degradation and hydrologic insecurity. Muslim nations at the UN must take the lead in mobilizing the international scientific community for the rehabilitation of hydraulic infrastructure and the development of new large- and small-scale water delivery and purification technologies to restore the aquatic vitality of war-ravaged Afghanistan. Local communities must be in charge of the social implementation of these remedial technologies using a lived experience, sustainable capabilities-centered approach to achieving the universal human right to water for the people and ecosystems of Afghanistan (Jepson et al. 2019; Sultana and Loftus 2019).

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